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ABSTRACT

This publication, which is divided into three parts, contains the report of a study group of the National Institute of Education which met to investigate some of the problems of linguistic communication. Part 1 summarizes the general point of view of the group. Part 2 discusses objectives, strategies, current status, and time scale. Part 3 describes research activities which cover the social and developmental context with influences outside the classroom, characteristics of teachers and classroom, characteristics of the reader, influence on reading of dialectal variation, and the processes of reading and writing, especially basic literacy, comprehension of language, writing, and second language learning. The study group recommends a program of research and development on learning and instruction in the elements of linguistic communication--reading, writing, listening, speaking--including interactions among these elements. (SW)

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Linguistic Communication: Perspectives for Research

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The Rockefeller University

Report of the
Study Group on Linguistic Communication
to the National Institute of Education

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The International Reading Association attempts, through its publications, to provide a forum for a wide spectrum of opinion on reading. This policy permits divergent viewpoints without assuming the endorsement of the Association.

FOREWORD

The most commonly perceived definition of literacy is the "ability to use correspondences of visual shapes to spoken sounds in order to decode written materials, and to translate them into oral language." The more common definitions of the word place this ability at a relatively low level of decoding and at the lower level of the thinking process.

The authors of this publication perceive literacy in a broader sense. They aver that "reading and writing are tools, not goals" and that "literacy poses a problem for the whole society not merely for the school child and his teacher." The authors also affirm that literacy skills are acquired in many ways and in many situations not solely within the classroom.

This publication constitutes the report by a study group organized by the National Institute for Education to study some of the problems of linguistic communication. It recommends "a program of research and development on learning and instruction in the elements of linguistic communication – reading, writing, listening, speaking – including interactions among these elements."

The publication by the International Reading Association of this report is a service to its membership and the profession; it provides the vehicle for sharing with other disciplines the ideas formulated by the study group and offers suggested areas for needed research.

The Association expresses its appreciation to the National Institute for Education, both for having funded this most important and productive conference and for having granted permission to IRA to publish the report of the study group. The Association, as is the entire educational profession, is deeply indebted to the individuals who participated in the conference and who prepared this report.

Millard H. Black, *President*
International Reading Association
1973-1974

PREFACE

In early December 1973 the National Institute of Education established five priority areas. One priority area is called the Essential Skills Program. Primary emphasis during the first year of the program has been directed toward issues in Linguistic Communication.

To a substantial degree the report of the Summer Study group in Linguistic Communication has served to guide the efforts of the Essential Skills Program. In particular, the program has geared its activities to the two areas defined by the Summer Study as "the most pressing national problems of literacy at the present time ...

1. Imparting basic literacy to those who most need it.
2. Raising language comprehension in the entire population."

Activities in the first problem area were already being carried out by the NIE, although not in a coordinated, purposeful fashion. Roughly five million dollars per year, for example, has been devoted during the first two years of NIE to provide continuing support to curriculum development and related reading research designed to improve instruction in elementary schools. Much of this work concentrates on the creation of new methods to impart basic literacy skills to all children. A first task of the Essential Skills Program has been to pull this work together in an attempt to describe institute activities to persons interested in reading research and development and to provide information for future directions of the program.

In the second problem area the Essential Skills Program has initiated a number of the activities suggested by the Summer Study. We have attempted to create a balanced program in language comprehension with emphasis being placed both on deflecting researchers in Artificial Intelligence, Visual Information Processing, and Linguistics to attend to applied issues in language comprehension and on supporting other researchers to pursue information about the state of current practice in teaching comprehension skills in the schools. Much of the work during the first six months of the program has been geared to the development of a systematic agenda for the next three to five years of NIE's activities in language comprehension.

Throughout this planning process we have attempted to solicit suggestions and reactions from a wide variety of scientists and practitioners. The publication of this report by the International Reading Association represents a major part in this effort to involve interested parties in our attempt to create as responsible and responsive a program as possible.

Marshall S. Smith, *Acting Assistant Director*
National Institute of Education
May 1974

ACKNOWLEDGEMENTS

From August 13 to 24, 1973, the National Institute of Education sponsored a Study Group on Linguistic Communication in the Hyannis area of Massachusetts. The purpose of the Study Group was "To recommend a program of research and development on learning and instruction in the elements of linguistic communication – reading, writing, listening, speaking – including interactions among these elements." The Study Group consisted of:

George A. Miller, Chairman, The Rockefeller University
John B. Carroll, Educational Testing Service
Courtney B. Cazden, Harvard University
David Elkind, University of Rochester
Samuel Gibbon, Children's Television Workshop
William Hall, Vassar College
Julian Hochberg, Columbia University
William Kessen, Yale University
Herbert A. Simon, Carnegie-Mellon University
Marshall S. Smith, National Institute of Education

The National Institute of Education staff consisted of John Mays, Donald Fisher, and Monte Penney. Donna Lyons served as administrative assistant. Consultants who briefed the Study Group were:

Robert L. Baker, Southwest Regional Educational Laboratory
Cynthia Brown, Berkeley, California
Robert C. Calfee, Stanford University
John Coe, Oxfordshire School Authority
Edmund Coleman, University of Texas at El Paso
Edward DeAvila, Bicultural Children's Television
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Jane W. Torrey, Connecticut College for Women
Richard Venezky, University of Wisconsin
Stanley Wanat, International Reading Association
H. A. Wilson, National Assessment of Educational Progress

On the basis of these two weeks of discussion, a first draft of this report was written. Subsequent editing has smoothed the style somewhat, but the main conclusions of the report have been left to stand much as they were formulated by the Study Group as of August 24, 1973. The principal addition is Part I, which attempts to summarize briefly the general point of view at which the Study Group arrived.

PART I INTRODUCTION

Communication binds people together, and, of all the ways people communicate, human language is the most important. It is in the public interest that everyone have the basic skills required for linguistic communication.

The most basic linguistic skill is speech. The ability to produce and understand spoken messages is essential for social life. Children normally acquire this ability without formal education. Educational problems arise when the spoken language that the child acquires at home differs from the language used in school.

Many social groups rely entirely on spoken language. If written language is little known or used, people regulate their social lives by an oral tradition; even in the United States there are communities that have developed oral subcultures. In the industrialized countries, however, many opportunities are denied to those who are unable to read and write. In particular, our educational system assumes that by the fourth grade children will have acquired basic literacy skills; those who have not acquired them find it difficult to take advantage of subsequent educational opportunities. Although an ability to read and write is second in importance to the use of spoken language, illiteracy is a source of many social and economic problems. Accordingly, a heavy emphasis is placed on reading and writing skills in the following report.

An illiterate person must turn to others to learn of the most private messages written to him by friends or relatives. He must depend on others to fill out tax and social security forms; to read the fine print on insurance contracts, guarantees, leases; to transcribe his own intimate written messages. Friends and neighbors must be relied on to provide transportation when public facilities are unavailable, to keep him informed about consumer options, to read to his children in the evening. His occupational choice is severely restricted. Dependence on others for help in day to day decisions and activities constantly encroaches on his individual freedom and privacy; even when aid is substantial,

many opportunities cannot be enjoyed. Privacy and the freedom to know and to do are limited privileges for an illiterate individual.

Clearly, this nation has a responsibility to provide everyone the opportunity to overcome such limitations. This responsibility has been recognized by the institution of universal free education. *It is not the intent of this report to propose extensive new responsibilities, but to suggest how research and development activities and applications of knowledge gained through these activities can be used to make more effective the large resources we already devote to the achievement of literacy.*

Although the United States ranks high among nations in the literacy of its people, not all of our problems of literacy have been solved. Estimates of the magnitude of the problems we still face obviously depend on what level of literacy is taken as the indispensable minimum. About a quarter million young adults are estimated to be illiterate even at the lowest level; more realistic definitions lead to higher estimates.

These handicapped persons come from all parts of society. In proportional terms, however, an all too familiar picture emerges. Although the schools are managing to teach most children to read and write, disproportionate numbers of the poor, speakers of languages other than English, and members of cultural minorities do not master even the most basic skills – the ability to interpret single sentences, or to follow simple written instructions.

When we ask about the more advanced skills and knowledge required to understand anything beyond the simplest written messages, the success rates of our schools are lower than they should be for all parts of the population. Reading and writing are tools, not goals; they are the tools needed to change the way we think and what we think about. Highly literate people not only can satisfy the practical demands of letter writing and recordkeeping, but also have assess to the whole world of written knowledge. These more advanced goals are not easy to define operationally, but they must not be ignored in setting national policy.

The most pressing national problems of literacy at the present time seem to fall under two general headings:

1. Imparting basic literacy to those who most need it.
2. Raising language comprehension in the entire population.

It is unlikely that either class of problems can be solved in any single setting – for example, in the early grades of school – or by any single method. Literacy poses a problem for the whole society, not merely for the school child and his teacher. Literacy skills are not acquired solely in the classroom situation. By historical accident we have inherited a conception of reading instruction that pictures a white, middle-class school child patiently sounding out stories about

Throughout this report we will speak of **basic literacy, comprehension,** and **functional** or **practical literacy.**

Basic literacy means ability to use correspondences of visual shapes to spoken sounds in order to decode written materials and to translate them into oral language.

Comprehension means ability to understand the meaning of verbal materials.

Functional or **practical literacy** means ability to read (decode and comprehend) materials needed to perform everyday and vocational tasks.

Literacy in all of these meanings admits of important variations of level and content, as are described.

Dick and Jane. A recurrent theme of our discussion was *the need to broaden this picture in every direction – toward minority communities, toward adult illiterates, toward the deeper processes of understanding language, toward different types of reading materials, toward situations outside the classroom.* It is our strong conviction that the most challenging and important social and scientific problems related to linguistic skills are to be found in this area surrounding the traditional focus of reading instruction.

Given this brief analysis of the problems, certain general recommendations to the National Institute of Education follow naturally. Specific recommendations and strategies for implementing them are contained in the body of the report.

A. *ASSESSMENT*

Although available evidence convinces us of the general urgency of the problem, we are still not well enough informed about its exact magnitude and prevalence in our society. Immediate steps should be taken to consider how functional literacy should be defined and what criteria should be used as standards for its achievement. At the same time, political and fiscal reality demand that the NIE set feasible national goals and that the NIE be able to monitor success in promoting those objectives.

1. The NIE should establish criteria by which to measure functional literacy, and develop special competence in the assessment of functional literacy and its underlying skills. In particular, the NIE should develop alternatives to the presently widely used grade-level criteria.

A reader's skills can be measured against those of other people (norm-referenced measures) or against the skills needed, according to observation or theory, for functional literacy (criterion-referenced measures).

1. Reading grade levels are a form of norm-referenced measure.
   Criterion-referenced measures could be based on:
2. Written materials and messages used by the society at large.
3. Written materials and messages representative of theoretically based components of comprehension.
4. Written materials and messages equal in difficulty level to the listening comprehension level of the individual.

Most of the information we now have is of the first, norm-referenced kind. Properly interpreted, these data may be of great aid in determining inadequacies in our instructional efforts. Unfortunately, however, the nature of a normative measure pits schools and groups against one another in a senseless race where some will always be losers. Moreover, it is only through great effort that measures obtained from these data can be related to the demands of the society, to the nature of the reading task itself, or to the capacities of the individual. We believe that grade level criteria may often be more misleading than informative.

The other three procedures for assessment are designed to overcome these deficiencies. The second approach is most relevant to obtaining basic social and economic parity among groups and individuals in the society. It involves the simultaneous assessment of the critical demands made by society on the literacy skills of individuals and the development of tools to determine individual competence in these skills. Great strides have already been made in both areas; they should be actively pursued. Although this approach is clearly criterion rather than norm referenced in the short run, its reliance on the present demands of the society implies a normative referent; as society changes, so presumably will the demands on the literacy skills of individuals.

The third and fourth approaches should be less subject to the winds of change. Both approaches, however, will require considerable research and time before they can be implemented. The third assumes the existence of a deeper theoretical understanding than we at present possess. The fourth defines a criterion that takes individual differences into account, but too little is presently known about the reliability and validity of different ways of measuring equal competence in spoken and written communication.

In addition to the technical advantages and disadvantages of each of the four approaches, their social and political implications need to be weighed carefully.

B. *FIRST TASKS*

Although at present we lack sufficient information to define accurately the precise scope of the problem, our initial assessment indicates that we should not wait for further research to start or intensify programs at both the basic and functional levels for those groups or individuals most in need, since it is clear

that many people have not attained an adequate level of functional literacy under our present system of instruction.

> **II. The NIE should support research and development designed to find means of raising literacy to the levels required for effective functioning in society.**

Although functional literacy remains to be fully defined, we are at a point where we can identify a set of face-valid, functional, reading tasks.

> **III. The NIE should give first priority to research and development aimed at improving the acquisition of basic literacy by persons from low income families and minority communities.**

As stated, recommendations II and III are less precise than we wish they were. The body of the report suggests possible criteria and strategies for the definition of goals in both areas, basic and functional; we did not consider it our prerogative to choose among the alternatives. We strongly suggest that the NIE program in linguistic communication take as an initial responsibility the task of defining goals for these two foci. Whatever specific goals are defined, however, our analysis suggests that there is available a set of general approaches that will facilitate their accomplishment.

C. *CULTURE AND MOTIVATION*

How much a student will learn depends on how and how much he studies; these, in turn, depend on his motivation to learn. Better ways of sustaining a student's motivation to learn to read and write are needed.

Analyses of methods for imparting communication skills must take account of the particular needs of the concerned groups. The audience for such efforts is quite heterogeneous; no single curriculum will serve them all equally well. Even those whose first language is Spanish come from quite different cultural backgrounds – Cuban, Puerto Rican, Mexican – and this situation is different from native Americans or those who speak the black English vernacular. Cutting across these cultural differences are the different requirements of illiterate adults who have little motivation to read the adventures of Dick and Jane. There has been considerable attention paid in recent years to the advantages of individualized instruction for each child; comparable attention must be paid to the individualization of instruction for each culture. Unfortunately, many basic questions remain unanswered: Is there convincing evidence that black children will learn more rapidly if they begin reading the black vernacular? Should children from Spanish speaking homes learn to read Spanish first? Can teachers be prepared to develop reading materials of their own in such situations? And so on. These and related problems are discussed in the body of the report.

Since reading instruction is a major task of the early grades, the match of school to home environment may have particular relevance to the development of linguistic communication skills. We do not feel that it is enough simply to make reading materials reflect more accurately an individual's cultural heritage – although that is an important start. Other aspects of schooling may have to be tailored to a student's cultural background. We know that the social context is important – socioeconomic status of the family has been one of the best predictors of a child's eventual success in learning to read and write – but we know little about how the social context affects learning. Some now believe that specific environmental factors can be identified, so that the real problems can be more clearly defined.

Efforts to integrate the various linguistic experiences of the child need to be pursued further. In order to sustain the student's motivation to learn, reading and writing should be integrated with other classroom activities, should be made to fit the interests and purposes of the individual, and should be carried out in the home and other places as well as the school.

IV. The NIE should

a. explore ways of relating the curriculum and the school to the child's home and peer culture, and

b. actively promote the development of strategies for raising literacy by integrating reading and writing into the life and interests of the individual, outside as well as inside the classroom.

We believe that this recommendation represents the best general approach to maintaining the student's motivation, and that it can be implemented both for the teaching of reading and the teaching of writing.

Reading conceived as a separate course of study – "Put away your comic books, children, it's time for Reading" – reading confined solely to basal readers, reading taught as a highly stylized and rule-bound task, all tend to push the idea of reading as communication, as power and discovery through communication, into the background. Reading must be made interesting and relevant. A child intrigued by auto mechanics might be encouraged to bring manuals to class, and to bring life to the manuals by working on engines within the school.

As for writing, an initial deemphasis of certain stylistic rules, letter-perfect spelling and punctuation-perfect paragraphs, with more emphasis on writing as communication (without distracting corrections) should create an atmosphere in which communication is fun, in which both reading and writing (especially, reading what the student himself has written) take on additional interest.

Children should not be led to think of reading and writing as tasks unique to the schoolroom. If literacy is the responsibility of the whole culture, its advantages should be seen outside the schools. Alternative opportunities for developing reading skills are needed for adult illiterates in any case. And reading

instruction for children *in* the classroom should be supported by a world outside that will contribute to their general knowledge base. Special attention should be given to possibilities for reading instruction in the home and via the mass media, particularly television.

D. *UNDERSTANDING HOW PEOPLE COMMUNICATE*

The recommendations above are based more on general experience than on an explicit theory about how people communicate. Much further exploration of the theoretical aspects of reading acquisition and comprehension is needed. Although the process is complex, understanding the ability to decode, interpret, and comprehend written materials has advanced significantly in recent years, particularly through the work in cognitive psychology and artificial intelligence. In order to build a scientific base for future applications, this work deserves attention and support.

V. The NIE should actively support efforts to understand

a. the cognitive processes involved in acquiring basic reading skills and

b. the cognitive processes involved in comprehending linguistic messages.

Comprehension is the purpose of reading, yet we know far too little about the knowledge and conceptual organization needed for advanced reading competence. Although we have learned much about the legibility of type, patterns of eye movements, rates of information processing, and the like, these facts have not been put together in a coherent scientific theory of reading. We must understand better the higher mental processes that control the intentional act of reading. *Because principled improvements in current practice will depend on sound theory of the skills to be taught, recommendation V deserves high priority.*

E. *IMPLEMENTATION*

The NIE must employ personnel competent to direct and supervise efforts to implement these recommendations.

VI. The NIE should employ staff and make administrative arrangements to undertake effective programs of research and development on the educational problems of linguistic communication.

All other recommendations presuppose the existence of an effective unit of this kind.

F. *A FINAL THOUGHT*

A recurrent lament heard during our discussions was that professionals concerned with linguistic communication do not communicate with each other. Teachers of reading have no easy way to learn of effective instructional tactics developed by other teachers. Research workers interested in the reading process come from such a variety of professional and academic backgrounds that they are often unaware of their common objectives. And the greatest gap is between the teacher and the research worker.

Our own attempts to understand this failure of communication led us to speak of "the predicament of perspectives;" teacher, researcher, and student often have very different conceptions of reading and of learning to read. Teachers should adopt the widest possible framework. Their concerns, eventuating in procedures that will be effective in the classroom, are with the detection and diagnosis of potential reading problems, selection of effective methods of dealing with them, and instruction itself. Proper detection and diagnosis require an understanding of both the scientific perspective – an effort to analyze complex skills into their component processes – and the child's interest in reading and writing in relation to the organic growth of the child's general skills in linguistic communication. The transition from a knowledge of what the problem is to what to do about it is most often left undetermined by the scientist. The materials of instruction should be related both to theory and to the child's needs.

> **VII. The NIE should support efforts to make explicit not only the scientist's theories of reading and of learning to read, but also the perspectives of the teacher and the student, with the aim of facilitating communication among them.**

This recommendation assumes that the critical step in improving communication between scientists and teachers, and between teachers and students, is to make explicit the differences in basic assumptions with which they approach their common concerns.

PART II OBJECTIVES AND STRATEGIES

The nation has often reaffirmed its responsibility for providing opportunity to all citizens to become full participants in the national life as producers, as consumers, as citizens, as human beings. To the extent that understanding the spoken and written word is important for exercising that opportunity, it becomes a national responsiblity to see that all citizens are literate.

However, we do not wish to exaggerate the importance of comprehension skills, and especially reading skills, in the routine of everyday living. The reading requirements of many occupations are quite modest; probably only a relatively small proportion of all jobs require more than current eighth-grade reading comprehension.* Moreover, the formal admissions requirements for occupations sometimes overstate the real importance of reading skill, or of other formal training, to job performance.

A persistent concern of members of minority communities, most vocally expressed by black Americans, has been their record in passing standardized employment tests. One reason given for this state of affairs centers on the mismatch between most standardized employment tests and the actual requirements for jobs. Indeed, some recent data suggest that many tests for jobs such as that of patrolman might well be used to admit students to the most selective of our colleges. Readability estimates place much of this material well beyond the formal educational level required to qualify for the job. The extent of literacy in fact required for employment can only be ascertained through job-analyses and other studies of a carefully constructed sample of a variety of occupations.

Even the most bookish among us depend on high-level reading skills only during a small portion of each day. Nor is there evidence that raising an eighth-grade reader's skill to the twelfth-grade level will contribute much to his performance as a voter. Voting in a democracy rests on no presumption of

*We would have preferred to express this point by citing criterion-referenced test results. However, until adequate criterion-referenced tests are developed and utilized we are obliged to depend upon norm-referenced measures.

universal expertness on subjects of public policy; rather, it rests on the observation that adults of ordinary intelligence and education can be competent judges of the integrity and performance of public officials, and shrewd judges, too, of how to protect themselves from injurious abuses of public power.

Having stated all these reservations, we must nevertheless conclude that a person with limited reading skills may be deprived of many benefits of our society. The importance of literacy cannot be measured by the number of occasions – many of them quite brief – when being able to read or not opens or closes a door of opportunity, shields one from an accident or exposes him to it, provides one with a sense of competence and independence or makes one dependent on others.

The skill of reading provides the reader with access to help-wanted ads in the newspapers, and to announcements of store sales. It allows him to find his way about the streets. (A visitor to Tokyo can experience something of the illiterate's problems of navigation.) It permits him to read instructions on a pesticide bottle and recipes in a cookbook. It permits him to read his mail, fill out his Social Security forms, obtain a driver's license.

The public responsibility to provide opportunities to learn to read and write is discharged primarily by the American public school system which offers universal free education through the twelfth grade. *Thus, national objectives must be translated into objectives for the educational system* since the schools are the most important instruments available for achieving our objectives. Although there is a sizeable number of adult illiterates who should be offered educational opportunities, our prevailing national strategy is preventive – to improve the teaching of reading and writing in order to prevent more children from growing into illiterate adults.

Perhaps because universal literacy has always been a goal of our educational system, familiarity has led us to assume we know what it means. Programs advocating every person's right to learn to read receive broad public attention. Yet these goals or rights are inherently vague. What level of competence is to be counted as literacy? Do we mean literacy in English or in any language? What particular language skills are involved? What degree of accomplishment in each should be described as the indispensable minimum? When one attempts to assess the current situation, the range of language skills achieved by different individuals becomes apparent. If one defines the national objective at a relatively low level, the magnitude of the problem can be underestimated. The higher the national level one aspires to, the greater the number who will need education and the more difficult the achievement will become.

Somewhere near the core of the responsibility accepted by our schools is a picture, shaped by tradition, of a white, middle-class child sitting quietly in a classroom patiently sounding out the words in simple stories. When one focuses on this picture, it seems reasonably pleasant – that is not where our national

problems of literacy originate. As one expands this view to include minority groups, adult illiterates, understanding what is sounded out, alternative reading materials, and the out-of-school uses to which reading ability is expected to transfer, the problems begin to appear.

Language minorities face special problems, not just in reading, but in making full use of the educational opportunities available to them. In the United States most of the information we want citizens to have is communicated in standard English. This is true in the mass media generally, as well as in the schools. *The student's knowledge of English is thus the cornerstone of our educational plan.* Some of the most serious problems confronting our educational system today arise from the fact that students – particularly students in the inner cities – do not enter the schools with equal linguistic competencies. Some speak no English at all, some speak nonstandard English, and even those who speak English will not have mastered all the language skills they will require in the course of their educational experience. In this connection, William Labov (1972) has written the following.

> Many skills have to be acquired before we can say that a person has learned standard English. The following list is a scale of priorities that I would suggest as helpful in concentrating our attention on the most important problems:
>
> a. Ability to understand spoken English (of the teacher)
> b. Ability to read and comprehend
> c. Ability to communicate (to the teacher) in spoken English
> d. Ability to communicate in writing
> e. Ability to write in standard English grammar
> f. Ability to spell correctly
> g. Ability to use standard English grammar in speaking
> h. Ability to speak with a prestige pattern of pronunciation (and avoid stigmatized forms). (p. 5)

We usually assume *a* and take *b* to be the first academic task for the child. But when *a* is deficient, its amelioration should take priority over *b*.

Labov's list serves to remind us of the complexity of the task faced by the schools, and of the corresponding complexity that must be incorporated into any well-defined national objective. And even if we had a well-defined objective and a valid assessment of our current distance from it, we would still face decisions as to which actions would most effectively reduce the distance. The bulk of the present report is concerned with this third, tactical stage of the national program.

Definitions of literacy have been as wide as they have been deep; at one time or another, oral speaking and writing skills have been related to definitions of literacy. We must examine some of the existing definitions and objectives, not only for their theoretical and functional relevance, but also in the light of political practicality.

A. *OBJECTIVES*

1. Basic Literacy

The discussions of the Study Group used a rough distinction between a) basic or initial reading skills, and b) comprehension, particularly as it involved functional, practical, or advanced reading skills – between the skills needed to transform written symbols into speech and the skills and knowledge needed in occupations, and on consumers and citizens. We recognize the artificiality of this distinction, since at every level of skill reading is an effort after meaning, yet it serves as a convenient expository device for separating out the rather different educational problems involved in each case.

The distinction can also serve a useful purpose in formulating objectives. The skill of correctly decoding written language could serve as a standard of basic literacy for our society. One definition of "basic literacy" might be the ability to read aloud a selected list of words; a second might be the ability to read aloud selected sentences.

Extent of problem. *We believe that, with few exceptions, everyone could achieve basic literacy with proper instruction and support.* A very large fraction of the population has progressed well beyond this minimal criterion, yet there are pockets of people for whom basic literacy is yet to be achieved.

We know of no attempt to detect and determine systematically the degree of failure to achieve this minimal level in the general population. Such data could have great importance for national policy. Unless there are reliable data of which we are unaware, **we recommend an assessment to determine specifically to what extent an objective of "universal minimal literacy" has been accomplished in the adult population.** The survey would be a probability sample, weighing those subgroups in the population where an inability to read words and sentences aloud might be expected.

2. Comprehension and Functional Literacy: Occupation

With improvements in our methods of measuring literacy and the cognitive processes associated with it, we may soon be able to define a national goal in such a way that we could adapt it to the wide variety of individual circumstances and, at the very least, be able to recognize when we had achieved it. One line of attack would be to ask the educational system to give everyone the ability to read up to the level required of him by his occupation.

Although there are clear virtues to such an approach, this line of thinking does not seem to lead to a satisfactory definition of a national goal. Not only are most of the reading students in the schools too young to have any occupation, but it would be difficult to avoid the inference that no one had a right to read beyond the requirements of his occupation – that the ambitious worker would not have educational support in attaining jobs beyond his present level of reading ability.

As an alternative, we might want the educational system to bring everyone to that reading achievement level which at least 80 percent of those gainfully employed were required to have. This would lead to an extensive survey of the literacy requirements for all definable occupations, and to the development of instructional materials specifically aimed at each.

Extent of problem. Preliminary evidence suggests two key points:

a. Scattered data indicate that only a relatively low level (8th grade) of communication skill is sufficient to acquire the knowledge to perform adequately in many occupations.

b. Other data indicate that there is little relation between reading comprehension and on the job performance ratings within occupational categories. *Taken together these data imply that most people could achieve the communication skills required to perform competently in most occupations.*

Were these data substantiated, they might also alert teachers, parents, and workers to the possibility that occupational opportunities are far more available than previously imagined. Too, it would give teachers some absolute performance criteria to aim at – criteria related to reading skills demanded by the society. And if employers and unions realized that only a basic level of literacy is required to perform adequately in most occupations, *the entrance requirements to many jobs might be reduced. Similarly, other literacy demands made by the society might be eased* when, for example, lawyers and advertisers realize that they are not communicating with some members of society. At the very least, these data would focus attention on how to change societal activities that are currently selective and exclusive.

We recommend that two types of data be gathered for a random sample of occupations in the society:

a. **Data on the level of reading skills required to have access to the occupation.**

b. **Data on the level of reading skills necessary to gain the knowledge to be able to perform adequately in the occupation.**

3. Comprehension and Functional Literacy: Consumer Choice

Another approach to specifying functional literacy is suggested by placing a high value on the notion of *consumer choice.* Consumer choice implies that most people have the skills and knowledge to make informed decisions when faced with important life choices.

A decision to maximize the potential choices open to an individual could involve us in a wide variety of activities. A basic core of skills and knowledge can be enumerated if there are universal situations – situations that everyone can be reasonably expected to encounter – where reading and thinking skills are required to make informed decisions. Activities dependent on reading and thinking ability and related to the areas of need immediately present themselves.

a. Consumer Economics: product labels, advertising, cookbooks, nutritional documents, shopping ads, yellow pages, consumer reports.

b. Health: life insurance, health insurance, health instructions from school to home.

c. Transportation: schedules, place names, directional signs.

d. Government and Law: voting literature, apartment leasing contracts, rights as a citizen.

e. Community Resources: telephone directory, appropriate newspaper articles, bulletin board notices.

f. Occupational Opportunities: want ads, employment brochures.

Skills needed to comprehend materials in these areas should be understood and appropriate assessment instruments developed and utilized. This would disclose pockets in the population where people do not have the skills and information to exercise real freedom of choice. Resources might then be directed toward alleviating deficiencies in knowledge and basic skills.

Extent of the problem. In order to pursue this approach, we offer a variety of recommendations. At present, there are at least three on-going efforts to assess functional literacy in the nation. The Educational Testing Service is just completing a national survey of reading skills – the items on the survey were suggested by prior survey of the reading habits and requirements in the population. The National Assessment of Educational Progress will be carrying out a similar survey in the very near future. Northcutt (1973) has also carried out a similar assessment. **We recommend that NIE pay close attention to the results of these surveys and engage in active communication with the three groups about implications, problems and gaps in the data.** This activity should be initiated immediately.

4. **Equalization of Subgroup Norms**

One objective advanced has been the attainment of similar scores or achievement levels on reading tests by various population subgroups. Literacy is, under that objective, defined as that which is measured by the standardized reading tests, at a level for all population subgroups equal to the grand mean. **Until the nation takes dramatic steps to "equalize" the quality of life in general across population subgroups, we will continue to find group differences in literacy.** Such group differences might disappear or need radical reinterpretation were we instead to develop criteria for literacy based on theoretical and functional notions that can be used to guide local and national policy.

Furthermore, to define our goals in terms of norms for the eighth or the twelfth (or any other) grade can be misleading, for the norm provides a moving instead of a stationary target at which to aim. If the average reading skills of the whole high-school population were raised substantially, but we used norm-referenced tests to measure literacy and constantly reset the norm, it would

appear that no progress had been made. The average student would still be average, and half the students would still fall below the norm, as before. *Progress toward literacy goals must be measured against standards based on theoretical or functional criteria, rather than norm-referenced standards. We must measure the reading comprehension levels that are required to handle specific kinds of reading materials that are used on the job, in the home, and in other life situations, and measure progress against these stable markers rather than the rubber rulers of norm-referenced standards.*

One strong evidence that levels of literacy and language understanding are not fixed once and for all is the significant trend in average absolute scores on the same measures that have taken place over the past fifty years (see, for example, Tuddenham, 1948; Schrader, 1968; Jencks et al, 1972, p. 63). A rough extrapolation of these data over the past fifty years leads us to estimate that we can expect an increase in average test performance of between one sixth and one quarter of a standard deviation per decade. Naturally, this rate of increase is not inevitable in the future, nor may we attribute it entirely to changes in schooling.

In order to evaluate progress toward our national objectives with respect to literacy, such studies should be replicated – preferably with measuring instruments based on criteria that do not shift over time, and with reading achievement, rather than general intelligence, as the variable to be measured. The questions that must be answered before this can be done are discussed in Part III.

5. Individual Potential

Another line of attack on the formulation of a national objective is to ask the educational system to provide the opportunity for everyone to read up to the limits of his own ability. The obvious objection to this approach is that it seems to require us to measure the limits of an individual's ability to read, and to do so at a time when our methods for measuring how well he *can* read – not to mention how well he *could* read – still need considerable improvement. There is a way to avoid this objection, however, that seems natural and well within the limits imposed by the present quality of our reading yardsticks. Suppose we were to consider two measures: a measure of the person's ability to comprehend spoken language, and a measure of his ability to comprehend written language. Then the task would be to devise measuring instruments that would enable us to determine for any given individual whether his reading comprehension was commensurate with his listening comprehension of English messages. Given appropriate instruments, a well-defined national goal would be to educate every reader up to a level commensurate with his listening comprehension.

Extent of problem. The development and validation of a testing procedure that would provide such a reading quotient might be a major undertaking. Not only might considerable research on listening comprehension and its relation to

reading comprehension be required, but special adaptations of the instrument would be required to deal with bilingual and bidialectal individuals. On the basis of the discussions we have been able to devote to this topic, the Study Group hesitates to recommend the development of such an instrument at the present time. **We do recommend, however, that a further group be assembled to pursue the possibility in greater detail – both with respect to the social and political consequences of formulating a national goal for reading in these terms, and with respect to the various research and development strategies that would most likely lead to a valid and reliable method of testing.** We recognize the possiblity that this approach may turn out to be more appropriate to individual diagnosis than to national or group assessment – this recommendation, therefore, applies equally to the diagnosis category (see page 28).

B. *STRATEGIES*

We must talk in the plural of the "problems of literacy." No single line can be drawn between those who are illiterate and those who are not. A person who can read the sports page may be unable to read the financial page (and vice versa). Or a person who can fill out a job application blank may be unable to read the manual that describes how to use a piece of equipment needed on the job. But these are relatively advanced levels of reading. If we consider the beginning reader – usually a young child entering the first grade – his first step toward reading and writing is to learn how to connect the printed word and the spoken language with which he is already familiar. Because it is so important, making this connection is sometimes regarded as the only problem of reading. Unfortunately, the real problems are much more complex.

1. Basic Literacy

Understanding the idea and purpose of representing familiar language and its meanings in printed forms, and acquiring a good level of skill interpreting such representations, are the central goals of the first two or three years of reading study. Crucial to the whole enterprise of learning to read is the child's attitude toward the task. A positive attitude is more important than acquisition of the ability to recognize a few letters or words. If these skills are acquired at the cost of the child's sense that reading is exciting and interesting, the price may be much too high. Positive attitudes towards reading seem best inculcated by an environment rich in reading materials, by adults who read themselves and who read regularly to children, and by the opportunity to express and represent experiences verbally and in print, and by entertainment derived from reading.

For the child embarked on such a learning experience, learning to read is an emotional and cognitive development that must form an organic whole, an integrated system of closely related skills that is never completely perfected. For the scientist and the teacher, whose tasks are to understand and supervise this

organic growth of reading skills, a more analytic conception is required. *For the child, reading and writing are a continuation and extension of oral language skills; for those who would hope to aid the child, reading and writing are complex packages of component skills that must be unfolded to the child in some sequence intelligible to him.* For the child, reading and writing represent an unusual focusing of attention on the linguistic aspects of communication, with progressively less support from the situational and linguistic context on which he has relied to acquire his oral mastery of language; for the scientist and teacher, this focussing is merely one of many abstractions that characterize the analysis of linguistic communication via the written word.

The scientist and the practitioner, therefore, find it convenient to draw distinctions that can organize their research and teaching, but that are merely different aspects of what the child experiences as an integrated whole. Thus, the analyst will frequently distinguish between certain basic skills required for identifying words and phrases from print, and certain advanced skills required for comprehending and using the information that the written signal encodes. But to the child, these are related aspects of his experience. He does not first learn to identify words from print and only then begin to think what they mean. From the beginning the child's task is to recover meaning from the written symbols; what changes is not his goal, but the nature of the obstacles that stand between him and his goal. At first his worst problems seem to be with identification and recognition; later his problems become those of comprehension and interpretation.

If a person's search for meaning is impeded by his inability to recognize the words represented by the written symbols, he presents problems of basic literacy; if his search for meaning is impeded by his inability to understand the meaning of the words and sentences he has recognized, he presents problems of comprehension. The kinds of help required in these two situations seem sufficiently different to justify the distinction as long as one does not conclude that comprehension is irrelevant during the learning of word identification, or that word identification is irrelevant during the learning of interpretive skills.

The ability to sound out the words that the text represents, regardless of whether they are understood – loosely speaking, the ability to *decode* – is the easiest of the reading-related abilities to assess. Even this apparently simple skill depends on many components: on being able to recognize the shapes and arrangements of letters and letter-groups; on being able to move one's eyes with appropriate precision and control; on being able to produce acceptable speech sounds in response to the visual patterns that comprise the printed text.

These skills are often not easy to acquire. We may be able to make a task more purposeful by various instructional innovations, but we cannot make it trivial. If conditions for sustained attention and motivation are not maintained, in appropriate emotional climates, the decoding ability may not be acquired.

Moreover, many young children appear to lack some of the component skills that contribute to the decoding ability, skills that they would normally acquire later in the course of their perceptual and cognitive development. If we can determine specifically which skills are missing, we can at best compensate for their absence, or at worst avoid drawing on abilities which the child does not yet have. Rather than gross assertions about "reading readiness" or "perceptual inadequacy," we need ways of determining what specific abilities are absent, and what roles they play in the development of literacy.

The number of persons facing problems of basic literacy is quite small in the United States – perhaps as low as half of one percent of the population of young adults. However, there is a significant additional number of persons whose initial reading skills are marginal and inadequate as a foundation for building.

2. Comprehension Skills

The factors that determine the reading ability of a ten-year-old, a high-school student, or an adult are seldom the same as those that limit the performance of the beginning reader; their reading problems have become the problems of threading their ways through complex grammatical forms and of organizing the ideas they extract from reading into coherent structures that can be retained and related to their experience and knowledge.

The problem of literacy at this level of comprehension may not be specifically a *reading* problem at all. It may be a much more general problem of ability to understand language, whether written or oral. Some evidence suggests that if a person with initial literacy can understand a spoken message, he can understand the identical message when it is presented in writing. If further research substantiates this finding, it has two important implications for education:

a. *To the degree that reading comprehension difficulties depend on general language understanding, educational programs will be successful only if they are effective in raising such language understanding.*

b. *The most effective instruction for raising levels of comprehension may not be reading instruction at all.*

What may be needed, for example, is broader real-world experience with the various kinds of objects and events that books and articles describe. Or, it may be that instruction in "how to think" or "how to solve problems" would be, for some, the most efficient route to functional literacy. Or, perhaps skill at comprehension at more advanced levels is better practiced and learned directly in the context of specific content, as a by-product, say, of learning history or automobile mechanics or mathematics.

That we do not know the answers to the questions posed here should not prevent us from making vigorous efforts to give everyone the ability to read the world of print that surrounds and permeates his everyday life. However, determining how many people do not possess adequate skills in comprehension is

more difficult than detecting weaknesses in basic literacy, for we have few measures of the levels of reading ability required to cope with the written materials encountered in various situations of everyday life.

All of the available statistics at the present time indicate that the problems of literacy are most acute for those who are poor or culturally different from majority groups. Is this a literacy problem? Or is it a social and moral problem? We are inclined to regard illiteracy as a symptom of deeper national problems. *The real challenge, therefore, derives less from the numbers of persons who are handicapped socially by inadequate linguistic skills than from the democratic obligation to provide equality of opportunity to all citizens.*

C. *CURRENT STATUS*

The teaching of reading is heavily institutionalized in the United States. A few children learn to read before entering school; a few school children may learn something about reading from television; but the overwhelming majority of Americans are taught to read in the first grades of school. This is not to say, of course, that reading competence is independent of events outside the classroom. The persistent relation found between characteristics of the home (indexed by SES or quantity of resources) and ability to read suggest that the child is, in some way, prepared for the tasks of reading by what happens to him at home before school. The dimensions of that preparation are by no means clear but will most certainly range from genetic influence to specific tuition in reading skills.

We are even less well able to measure the contribution to reading – especially, to comprehension – of the child's activities alone, on the playground, in the streets. If one takes the position that general understanding of his experience is a critical factor in the child's (or the adult's) ability to use language, then the variety of the child's out-of-school, out-of-home experience and his organization of that experience become relevant to his ability to comprehend what he reads.

The first formal encounter with reading in the first grade can be characterized in general terms. The child is one of about thirty who share the same classroom teacher; he is exposed to basal readers written in a limited vocabulary about episodes imagined to be of interest to all children, but the amount of time he actually spends discovering the correspondence between the written and the spoken language is usually slight; his initial skills are acquired in a sequence that depends on the teacher's strategy – he learns phonic rules, or is taught to recognize words printed on flash cards, or (less often) is coached to pronounce syllables, or the like; and he is expected to achieve a predetermined first-grade level of reading skill by the end of the school year. Some of the disadvantages of this instructional experience are obvious, and some children are fortunate enough to escape it in schools where strict grade levels are not maintained, where instruction is individualized, where attention is paid to the child's interests in

reading, where the child can advance at his own rate – but these are exceptions to the usual rule. Despite its limitations, however, the usual instructional system seems to work – at least for children whose prereading and out-of-school experience has prepared them for it.

When we ask what is being done for those who have passed through this instructional system without acquiring basic literacy, the answer seems to be, "Very little." When we ask what research is receiving support, most of it seems to be directed toward the established practices of the traditional system of reading instruction. When we ask what is being done to match reading instruction to the cultural background of the student, we find many small, interesting experiments in progress, but no national program. When we ask what is being done to teach reading-as-understanding, no one seems to know how it should be done.

In short, we are presently meeting our responsibility to develop initial skills in linguistic communication for the majority, but extensions of the existing system to deal with minority problems are being neglected, and potential improvements in the existing system are often resisted when they conflict with established policies.

D. *TIME SCALE*

The Study Group avoided imposing a linear sequence upon the tasks recommended throughout the report. Some long-range research tasks are so important that they should be begun now even though they may not be completed for many years. Other tasks can be scheduled for short or mid-range completion, depending upon their importance, visibility, and feasibility. In thinking about the time scale it is important to remember that it takes some seven to ten years from the initiation of a major curriculum program until its long-scale introduction into the school system. Although this time-lag might be somewhat reduced, at present it must be regarded as one of the facts of life in educational research and development. Thus, although certain actions should be undertaken immediately, their impact on the educational system may not be realized until far in the future.

PART III RESEARCH ACTIVITIES

A. *THE SOCIAL AND DEVELOPMENTAL CONTEXT*

Even in a limited discussion of research on the problems of literacy it is necessary to move beyond considering the child as a social statistic. *Effective programs must view the child as a developing individual, influenced by more than his school environment, actively trying to extend his skills in linguistic communication.* In this section we look at some of the lines of research that might profitably be undertaken to increase our understanding of the social and developmental context of learning to read.

Although research in this quadrant of the field of reading is voluminous, the results have attained neither the precision of method nor the sophistication of analysis that characterizes current research on the reading process itself. However, it is our opinion that accurate diagnosis of the sources of illiteracy will have to draw heavily on considerations of human development and interaction. The following pages will treat, in order, influences outside the conventional classroom, characteristics of teachers and classrooms, characteristics of the reader, assessment and diagnosis, and the influence on reading of variations in dialect.

1. Influences Outside the Classroom

One of the rare points of general agreement in the lore and literature of reading holds that the child's success in learning to read is tied essentially to his comprehension of spoken language. A more arguable form of the proposition is that the learner's effectiveness in reading is most intimately dependent on the complexity and fluency of his *conceptual* or *cognitive structures* – structures that may be even more fundamental than speech. Whichever form of the argument survives research, *the child's preparation for reading takes place before school and outside the classroom.* When we speak of basic literacy, we are talking about making connections between patterns of writing and some aspect of what the child already knows and what he can already say. When we speak of

comprehension, we are talking about the child's scores on tests, but also about his ability to use in his life beyond the classroom what he sees in print. And, beyond the preparation for reading that makes the child conceptually ready to read before he looks at his first pre-primer, there are a complicated and poorly understood set of motivational and attentional factors that influence his induction into literacy. These, too, are set underway during the years of his life before school.

"Preparation for reading" is accurate enough as a first statement of the influence of home, media, peers, and the street on learning to read, but the phrase may contain a misleading message. Some children are prepared very well for the kind of reading instruction they will receive; they possess, at age six, conceptual and motivational structures that fit the first-grade classroom they enter. Other children (and they have been disproportionately the poor, the black, the speakers of languages other than English) will not be prepared for the classroom they enter. It is not proper to conclude that their preparation is deficient or that the remedy lies in changing (or, less troublesome, merely blaming) the "ill-prepared" child and his family; rather, *we need to recognize that reading, particularly the kind of reading for use that we would emphasize, is prepared for in many different ways in American life, and that schools must be adapted to that diversity of preparation.* We should be past the time when the intellectual culture of the first grader is markedly narrower than the intellectual culture he knows outside the school. We should be, but we are not. In the proposals for research that follow, a guiding principle has been the need better to connect what the child brings to his first grade and what the first grade presents to him.

a. ***The preparation of readers and the match to school.*** There are sizable differences in early reading ability existing among children of different socioeconomic and ethnic groups. Research of the last decade has begun to study more carefully the characteristics of families that prepare children for present-day school procedures. Middle-class children, for example, are said to have been "taught to formulate and test hypotheses, to identify solutions tentatively, to expect and to deal with uncertainty, to respond to verbal rewards" – all characteristics that may influence their learning to read. Research in exploration of such variation should be continued with two important modifications. *First and foremost, research on variations among different groups should not be addressed exclusively to the test of success in learning to read in present-day conventional American school settings.* It may be that such settings are the evolutionary outcome of a social system selecting for effectiveness with children of the dominant culture. *The goal of new research should be to examine systematically the degree of match or mismatch between characteristics of American families and the characteristics of schools.* Second, *research should emphasize, even more than it has in the recent past, patterns of variables in the*

families of readers (and, of course, the families of nonreaders). The discouraging history of attempts to establish aptitude-treatment interactions suggests that we need, on one side, more intensive case and diary studies of reading and, on the other, thoughtful experiments in the natural settings of homes in order to illuminate the genesis and early history of the preparation for reading.

Cross-national and historical studies of early reading instruction, as well, may contribute to our understanding of what environments facilitate successful reading, but the most productive studies will probably be directed toward three interrelated questions:

(1) *What variations exist among American families in their preparation of children to read?* (For example, are there systematic variations in the way children are led to focus attention on a task or a game?)

(2) *What changes can be made in the lives of families that will make reading easier and more rewarding?* (For example, will simply making more books available to families change the preparation of children?)

(3) *What changes can be made in early instruction in reading that will take optimal account of the diversity of American child-rearing practices?* (For examples, will programs that encourage more active approaches to reading improve the relatively poorer performance of boys? Is television being adequately exploited?)

A specific example of an appropriate experiment would test the hypothesis that flooding the home environment will increase reading skills. It can be assumed that the correlations between characteristics of the home and reading achievement represent a two-way relation; it would be important to learn how much effect we might have by modifying the home environment. It would also be useful to know if we could reduce or remove the relation between reading achievement and the aggregate SES characteristics such as income, occupational level and parents' education by flooding homes with materials or by other strategies for encouraging reading.

b. ***The use of the child's experience.*** Beginning school represents, for many children, a significant discontinuity. They are suddenly placed in a setting that operates under a new set of rules and asked to perform tasks that many of them find strange and unconnected with the world beyond the classroom. *Strong support should be given to research that will explore new ways of relating the child's out-of-school experience to his first tries at reading,* particularly for children whose experience does not fit the traditional expectations of the school.

There is some anecdotal evidence (especially from the new English primary schools) of the effectiveness of programs based on the child's "own voice" and,

more, an accumulation of strategies, materials, and ideas about what a classroom tied to the child's experience should look like. We were impressed by the wide support given such a program by observers as different as the radical school reformers and the bicultural educators. In order to construct sensible changes in the environment of early learning, at least two lines of research are indicated:

(1) What is the world of American children like in the years before they enter school? *We need studies of family structure, communication patterns, and allocation of interest in order to arrange effective patterns of connection to school.* Again, the variety of American culture requires that such studies represent the variety of family cultures.

(2) What are effective ways to induct children into school? It is not necessary for all American six-year-olds to enter first grade on the Wednesday after Labor Day. Nor is it necessary that the transition from home to school be abrupt. *Research is required to understand the effects of staggered admission to school, of parental involvement in curriculum design and teaching, and the use of schools as educational centers for their communities.*

c. ***The measurement of competence.*** Elsewhere in this report we discuss the problems of assessing the abilities of children. *Measures of general conceptual ability* – perhaps based on Piaget's observations – *measures of attention, and measures of the comprehension of oral language can appropriately and usefully be devised for the child who is not yet in school.*

d. ***The media and reading.*** Surely the most important development in American education over the last two decades had been the introduction of universal television. We know remarkably little about the effect of the change in general, and with a modest exception (preliminary studies of the impact of *Sesame Street* and *The Electric Company*), we know nothing about the effect of television on reading. *Systematic studies of the effect of the media on reading, and research on new modes of television teaching must take a high place on the Institute's list of priorities.* The possibility of interactive television – where a viewer can communicate back to the source – by means of cable transmission should not be overlooked. The active involvement of parents and peers might also increase the effectiveness of televised instruction.

e. ***The adult learning to read.*** An unusual opportunity exists to study the preparation of readers and the interaction of motivation, setting, and competence. Open-enrollment colleges have discovered that some of their students do not read fluently and that some of them can scarcely read at all. *Retrospective research on the young adults who first learn to read fluently in college may tell us more about the social context of reading.* Careful studies of how such students learn to read as adults will help us to understand teaching and learning strategies and open as well another window on the definition of practical literacy.

f. ***A note on method.*** Research modes vary widely in studies of education. Without diminishing the importance of laboratory studies, *we recommend that more use be made of intensive case studies (for example, of the families of very good and very poor readers), anthropological type observations (for example, of differing ways of routing children from home-culture to school culture), and large-scale field experimental studies,* particularly those that involve differential support to families of preschool children.

2. **Characteristics of Teachers and Classrooms**

Despite the increasing weight of evidence from large-scale survey research that school factors make relatively little difference in determining achievement, we do not believe that the search for potent influences in the school environment should be given up. On the contrary, *we believe that hypotheses now exist, in the empirical results of small-scale studies and in theoretical models of school learning, that should be tested more systematically.*

There are several reasons for our insistence that such research is important and worthwhile. First, although home influences seem now, and may remain, the single largest correlate of school achievement, they explain only a small part of the total variance in reading skill. Second, the standardized norm-referenced tests used in these surveys of achievement are designed to differentiate among individuals rather than among environments. *Tests should be developed to assess mastery of particular skills defined either on theoretical or functional criteria.* We expect that such measures will aid the search for important school, curriculum, and teacher influences. Finally, large surveys of school achievement have generally used questionnaires to assess school and teacher characteristics. Most questionnaires produce superficial and sometimes even invalid data about the characteristics of schools, teachers, and classroom behavior, thereby making it hard to detect differences. *Instruments using direct observation of behavior and that are based on hypotheses about significant variables and configurations of variables are needed.*

In addition to refinement of large-scale studies, the following aspects of instruction, classrooms, and schools merit further investigation.

a. ***The stability of teacher effects.*** One assumption underlying research on teacher characteristics and, ultimately, much school-based research, *is that some teachers are consistently more effective than others. This assumption should be examined.* Two approaches are reasonable. First, it may be easier to detect significant characteristics of instructional settings in the primary grades because school influence is likely to be more potent with younger children or because few schools have consistent programs throughout their classrooms. Second, we should look at the consistency of classroom "gains" from one year to the next to obtain estimates of the "maximum" amount of effect that might be due to differences among teachers. One tentative set of findings using this approach suggests that the largest classroom differences were in the first grade, the next

largest in second grade, and so on in decreasing magnitudes until no differences remain at the fifth grade.

b. ***The place of structure in classrooms.*** Certain instructional models e.g., the structured, academically-oriented curricula appear to be significantly more successful in raising very early reading achievement than others. The common elements underlying this success should be sought, and the approach used should be studied longitudinally to determine if the success is retained during the later grades.

c. ***Gains during the school year and during the summer.*** It has been suggested that minority children tend to regress during summer vacations, whereas middle-class children may actually gain. If this observation could be established as valid for reading and linguistic competence, it would have obvious implications for potential intervention programs.

d. ***The effect of peer tutoring.*** Research on the roles of peers, particularly as tutors, should be continued and expanded. The tutoring process should also be defined to include observations of the value of sharing, not merely acquiring, new knowledge and skills; there may be too much competition too soon in the traditional classroom.

e. ***The characteristics of open classrooms.*** A list of variables has been cited as important in informal or open educational settings in both England and the United States: quiet spaces, emphasis on writing as well as reading, ignoring immature spelling, high relevancy of materials, cross-age grouping. These common elements represent the same quality of data as case studies can yield, and warrant more systematic research.

f. ***Opportunity and motivation.*** One model of school learning that offers hypotheses for further testing has been developed by Carroll (1963). It is possible that opportunity and motivation, two of Carroll's variables, may underlie and explain the effectiveness of a variety of successful programs. Some of the differences found in previous research on programs of teaching reading may be ascribable to different amounts of time spent by the child on some aspect of the reading process. And school-produced differences in motivation may explain the effectiveness of procedures designed to increase attention, if motivation controls the intensity of a child's attention at any given moment and the ability to sustain attention over long periods of time. One suggested approach for testing these hypotheses is to hold curriculum constant and to examine individual variation in the actual time spent attending to reading and learning to read. Using this approach, it should be possible to estimate the effect of the variables on child outcomes uncontaminated by curriculum differences.

Two different models are suggested for such research. One consists of case studies of successful readers, successful teachers, and successful schools. Another model entails comparative studies of programs where one or more variables is systematically varied. In the latter case, serious field development is needed first, followed by field experimentation.

Finally, we suggest that NIE should not *initiate further large-scale, cross-sectional research designed to estimate causal relations between school, home, and peer characteristics on the one hand and scholastic achievement on the other.* Cross-sectional surveys are appropriate for assessment activities, not for isolating causal mechanisms.

3. Characteristics of the Reader

Research relating to pupil characteristics has moved in many different directions and some problems have been much more fully explored than others. Among the most prominent issues in the area of pupil characteristics and reading are the following.

a. ***Characteristics of children who read early.*** Longitudinal studies of early reading have already been undertaken on a small scale and have raised some interesting questions. Some of these studies suggest that early reading is most beneficial for children of average intellectual ability and least beneficial to children of better than average intelligence. These preliminary findings need to be explored in much more detail because of their potential relevance to the whole issue of early reading instruction.

b. ***Children's conceptions of reading.*** If it is true (as we believe it is) that the child's overall attitude towards reading plays a part in his performance, then we should know how and what he thinks about the process of learning to read and about the nature of letters and words. Some preliminary results in this domain suggest that young children believe that one can only read at a certain age, and that young children have a very vague conception of what letters and words are.

c. ***Cross-cultural case studies.*** Descriptions of prereading experiences of children in different countries, together with information about their formal reading instruction and reading achievement, could be of interest. Obviously, vast cultural and language differences would impose limitations upon these comparisons, but they could nonetheless be suggestive. They might provide insights into the cultural context of learning to read that would not be possible to obtain in any other way. Moreover, from a practical point of view, there might well be teaching practices and materials used in these countries that are of value and which might be adapted to the teaching of American children.

d. ***Social psychology of the classroom.*** Much more work is needed on the classroom as an important social unit. Some studies suggest that particular combinations of teacher and pupil personality characteristics are most efficacious in learning. It is probably also true that certain combinations of children work better than others as a learning group. Within any school system, particular classes are known as either "good" or "bad" — it seems to be, in part at least, independent of the teacher who has the group. Research in this domain might make it possible one day to select children when they enter school in such a way

as to fit them into a group that would maximize their learning propensities and minimize factional controversies.

e. ***A note on method.*** In studies dealing with pupil characteristics, a range of methods is appropriate and should be applied. Observational studies of particular children and of classrooms, ethological studies of children on the playground or at home should have their place along with the more carefully controlled laboratory or classroom experiment. It is important to provide investigators wide latitude in getting at the problems they are attacking. Different levels of rigor can be expected in a field where there are many different problems at many different levels of conceptualization and investigation.

f. ***Diagnosis – understanding the child's competence.*** It is important that classroom teachers, as well as clinical specialists, be able to make sensitive and usable diagnosis of a child's preparation for reading and his growing competence. Some of the devices and instruments needed for understanding what the child knows already exist – others will need considerable research before they can be developed. Both circumstances should be flagged.

However, and the point cannot be too strongly made, the overriding problem in individual diagnosis is *not* in instrument development. It is rather in the attitude of teachers and other adults toward individual differences among children. If we could somehow convey the notion that diagnosis and teaching are inseparable, we might reduce the need for large-scale efforts in instrument development and rely more on the intuition and sensitivity of experienced teachers to evaluate the preparation, competence, and needs of their students.

4. Influence on Reading of Dialectal Variation

Current sociolinguistic data suggest that many children speak a well-ordered, highly structured dialect different from standard English. This fact may have implications for both test construction and the development of reading skills.

The importance of considering different language systems in test construction can be demonstrated in four areas of potential difficulty for the speaker of a non-standard dialect of English: in the content of the test questions and expected responses, in the verbal style required by the test, in the non-linguistic factors inherent in the testing situation, and in the linguistic aspects of the test. Substantive biases in tests can include specific vocabulary items, culture-specific pictures used in vocabulary tests, as well as culture-specific information questions.

In addition to receiving vocabulary and information penalizations, a child not in the mainstream can be hampered in his test performance by the verbal style required by a test. For example, in some subcultures, a standard of articulate description might be *specificity* and *brevity* rather than the test maker's usual standard of *generality* and *quantity* of description.

Situational factors can also work against speakers of non-standard dialects. The activity of being tested can be intimidating to a child and hamper his performance; the realization that he is expected to produce answers according to norms not characteristic of his own culture may cause him to resist the testing or even to refuse to participate. Moreover, forced interaction with an adult who speaks another dialect and is of a different race can have adverse effects on the test performance of children.

Purely linguistic aspects of the tests may also cause problems. We do not know to what degree speakers of other dialects, particularly young ones, comprehend standard English; different semantic connotations and denotations of words, and perhaps different implications and presuppositions of sentences in different dialects, may interfere with comprehension.

Given this state of affairs, what solutions can be offered? *A good first step is to consider alternatives to deficit theory when explaining cultural group differences in test performance.* When differences appear, researchers need to explore the different conditions which do, or do not, produce the variation. For example, the following line of questioning might be pursued: Why does the same question asked by an experimenter of different kinds of people receive different kinds of answers? What do respondents perceive the questions as really asking? What, in the respondents' culture or linguistic background, has made them interpret a question in a specific way? When the experimenter does not receive responses he considers appropriate, does he then ask himself what conditions are absent which serve as cues to elicit the appropriate response?

All of these questions are relevant when we consider black children. Poor reading performance by black children continues to plague the classroom. Many explanations have been advanced for this state of affairs; a recent one revolves around their language. There are two views of black children's language – as deficient and as different. The deficiency view is that the language of black children is an inferior form of standard English. The difference view is that black children's language is an expression of their culture and a viable system of linguistic communication, equal in dignity to any other. Proponents of the deficit theory would eliminate the black English vernacular and replace it with standard English. Thus the source of the problem would be removed. Those favoring a different theory would change the schools and methods and materials for teaching reading in order to accommodate to black children's language.

With regard to interference with reading when one is a non-standard English speaker, two kinds may exist: phonological and grammatical. The data on reading interference attributable to phonological characteristics of the black English vernacular are by no means clear. Most of the research suffers from some methodological flaw, so that the question of phonological interference in reading must remain open. The different syntax of the black English vernacular could interfere with reading (especially with comprehension) in two ways: interference

could arise where a standard English sentence is interpreted as a non-equivalent sentence in the vernacular, or when a speaker of the vernacular has to translate his own speech into standard English. However, the plausible claim that this "translation process" interferes with learning to read has not been firmly established.

The matter of dialect interference with reading is a complicated one, complicated primarily by the fact that children – particularly older children – are capable of code-switching; thus, they cannot be said to be monodialectal speakers.

What can be done? Clearly, there are black vernaculars that differ from standard English. The extent to which they interfere with reading acquisition is by no means clear; it is an area requiring further research. The lack of solid evidence here militates against a positive recommendation that black children be taught reading in their dialect. Further, some black parents are opposed to such a procedure, although good evidence of advantages might change their minds. An appropriate piece of research here would involve teaching children to read with dialectal supports – perhaps with dialect readers – and then comparing their reading with children taught to read by standard English readers. Such research should study children at different ages and stages in learning.

Speakers of a non-standard vernacular may have difficulties with current instructional offerings in reading and writing, but speakers of a different language can be completely frustrated. The problem is that instructional materials and procedures with special attention to ethnic minorities – comparable to the readers and trade books available to children who speak standard English – are not available. In this situation, the natural objective to set up is the production of an array of instructional offerings which are responsive to the various learning contexts within which minority children grow up. We suggest this is an area for further study by NIE.

B. *THE PROCESSES OF READING AND WRITING*

We do not know the degree to which an understanding of the fundamental cognitive and perceptual processes in reading can contribute to solutions of this nation's literacy problems; some experts hold that reading difficulties have predominantly social and political origins. But it seems likely that detailed knowledge of the abilities that are needed in order to read effectively will make it easier to diagnose and remedy the specific reading difficulties that occur in any given case, regardless of their social origins.

1. Basic Literacy

Basic literacy is a complex and purposeful activity which draws on many psychological processes and requires skills in a number of component abilities.

Inadequate development or use of any one or more of a number of component skills may impair the ability to retrieve the spoken word from the printed page. The processes that underlie these skills, therefore, all constitute potential sources of reading problems. We group the component skills and processes under four headings – pattern-vision skills, visual-phonic skills, visuomotor skills, and cognitive skills – and list what appear to be important areas of inquiry and application in each case.

a. ***Skills of pattern vision.*** A child must learn to distinguish and identify individual letters and letter groups over a wide variety of type styles and scripts. He must be able to recognize the spatial order in which the letters stand, and to translate that spatial order into a temporal sequence, if he is to be able to sound out syllables, words and sentences. And he must learn to recognize the patterns that are formed by common letter-groups, without dissecting them into their constituent letter-shapes, if he is to progress beyond the most primative stages of reading.

Although there have been many studies of the legibility of different styles of print, results have provided little knowledge in the areas where we need it most: *we need more knowledge about the distinctive features by which children learn to identify syllables and words; about how they learn those features; and about how the process of learning may be facilitated.* Research methods exist for the study of these questions, some research has been performed, and more is needed.

As skills develop beyond the most primitive levels, the reader's translation of text into speech is informed as much or more by the context and content of what he is reading, as it is by the individual patterns at which he is looking, and we need to know more about how this process works and where it fails. Several theoretical models have been sketched to describe this process, but none has been developed to the point where it can either be rigorously tested or fruitfully applied to diagnostic and remedial programs. Specific efforts in these directions should be encouraged.

b. ***Visual-phonic skills.*** Writing is a system for encoding meaning graphically. Reading is the translation from writing into that form of language from which the reader is already obtaining meaning. Phonemically oriented writing systems, including alphabetic systems like English, permit speech to be frozen in visible marks and subsequently defrosted back into speech. One basic problem in reading phonemicized writing might be conceived as discovering and using the rules of the graphic code to recover the original spoken language. This conception of reading pre-supposes that once the spoken-language form is recreated, its meaning will be evident; the reader who has mastered this skill will be limited only by his ability to comprehend the spoken language.

To view written English as merely a system of letter-sound correspondences, however, tends to obscure a significant property of alphabetic writing. Alphabetic writing systems encode spoken language not only at the phonological level, but also at the lexical, syntactic, and semantic levels. A good reader seldom resorts to phonemic decoding, although he can do so when he encounters unfamiliar words. In decoding printed English, a reader can analyze at the level of individual letters, letter clusters (digraphs and diphthongs), spelling patterns, syllables, morphemes, phrases, clauses, paragraphs. No single level of code analysis characterizes the task of extracting meaning.

The process that is often called "decoding" written English seems to have the following features:

(1) The end purpose of the process is the extraction of meaning, not the mere pronunciation of speech sounds. (Even at the phonological level of decoding it can be argued that the reader is uncovering the phonological "meaning" of the code, although our main concern here is with the semantic meaning of the code.)

(2) The mental activity of the reader in decoding written English, at whatever level of analysis, is an act of problem-solving requiring some degree of reasoning skill.

(3) Context is as important in decoding written English as it is in comprehending spoken English. Contextual clues of all kinds – phonological, lexical, syntactic – assist the reader at all levels of code analysis.

Before a child is ready for this learning experience, he must have certain component skills that the experience can build on. In addition to pattern discrimination and control of eye movements, there are also auditory skills that must be acquired prior to learning letter-sound correspondences. An ability to analyze speech into consonants and vowels may be particularly critical for children who are learning to read an alphabetic form of writing. If a child is unable, for whatever reason, to hear constituent phonemic elements, he will be mystified about what the printed letters are supposed to correspond to. It has been established that this ability is important, what to do for children who lack it is still a matter for debate. One approach postpones the problem by using whole syllables (or even rebuses) to introduce the idea of reading at the level of a syllabary, rather than an alphabet. Another approach develops special programs – e.g., word games based on such auditory contrasts as man-can-tan-fan, man-mad-map-mat, and so on – to train a child's ear to hear these segments of the speech flow. Studies directed toward the resolution of this argument should continue.

It is commonly assumed that familiarity with the names of the letters is a

by name, but most letter names differ from their phonological realization in speech, and the difference may confuse some children.

It is also commonly assumed that a child will be familiar with the various English words he is expected to identify from their written forms. Children whose first language is not English will not have mastered the "familiar words" they are expected to identify, and may even have difficulty hearing the component sounds in English speech. The special problems of bilingual and bidialectal children are discussed elsewhere – we consider here only children who already know and can pronounce the words whose alphabetic representations they are expected to learn.

Three stages of learning letter-sound correspondences are generally distinguished. The child must 1) master letter-sound correspondences, 2) learn to "blend" these sounds into syllabic units, and 3) learn to deal with polysyllabic units.

The *letter-sound correspondences* that occur in English orthography are very complex. Twenty-six letters of the alphabet must be used to represent between forty and fifty phonemes (the number depending on the precision of the phonological analysis). The mapping is many-many: in different contexts a letter may have different phonemic realizations and a phoneme may be represented by different letters. Attempts to estimate how many letter-sound correspondences there are have produced numbers over two hundred, of which no more than 25 percent can reasonably be considered special cases, or "exceptions." How many of these correspondences a child should learn can only be estimated from studies (not yet undertaken) of how much use they are to him.

If one imagines a child who knows all the rules relating letters to sounds, he would still not be a reader. He would still have to master the *skill of combining these speech sounds* – reading teachers call it *blending* – before he could convert the string of sounds into a recognizable word. Compared with learning the rules of correspondence, blending seems a logically simple task, yet teachers find it is one of the commonest sources of frustration for a beginning reader. A child may be able to look at *dog* and say aloud: "dee, oh, gee," or "duh, aw, guh." He may even to able to say these sounds in rapid succession, yet hear nothing in the resulting trisyllable "duhawguh" that reminds him of the monosyllabic *dog*. Blending is the converse of the auditory analysis of a spoken syllable into phonemes; some wor ers have seen a close relation between difficulties of synthesis and analysis. The synthetic process may be more complex, however, because the child must not only blend speech sounds into longer units, but must also take into account various silent letters (e.g., the final *e* in *hope*) or letter combinations that mark which particular letter-sound correspondence is appropriate (e.g. whether *o* is to be sounded as *ah* or *oh*).

The third set of skills that a beginning reader needs relate to the *formation of polysyllabic units*. Phonic rules will enable a child to sound out syllables, but

if his analysis of a polysyllabic word leads him to the wrong syllabification, he will produce an incorrect pronunciation. For example, *nation* may be seen as a trisyllable, "nah-tie-on," rather than a disyllable, "nay-shun." Problems posed by words built of two or more morphemes, such as "running," differ from those posed by polysyllabic morphemes like "nation." It is usually assumed that a child who reaches this problem will be able to solve it for himself; relatively little analysis has been devoted to problems at this level of difficulty.

Such analysis of the decoding operation lays bare its considerable complexity; the wonder is not that some children fail to master it, but that most children succeed. Not only must this complex system of rules be internalized; it must operate automatically at rates equal to or greater than the rates of normal speech if the child is to devote attention to the meaningful content that gives point and purpose to reading.

How should such skills be taught? A variety of answers have been offered, and repeated attempts have been made to evaluate the effectiveness of competing proposals. Consider two contrasting philosophies. A teacher who decides to teach letter-sound explicitly could demand the memorization of two hundred letter-sound correspondences, of complex rules needed to determine which correspondence is involved in any particular instance, and of rules for segmenting long words into the syllables to which the system of rules can apply. Alternatively, a teacher who decides that children should associate spoken words directly with printed letter-patterns (in much the way Chinese children learn to associate spoken words with written characters) would abandon the alphabetic principle of word identification on the basis of phonemic analysis. In such extreme forms, of course, neither philosophy is attractive. A child who recites rules to himself before he pronounces a word will be slow in gaining the speed required for competent reading. A child who learns every word as a new task may start more rapidly, but will be helpless when confronted by novel letter-patterns. In practice, therefore, instructional methods normally include both approaches. A child may be introduced to the idea of reading by learning a few words of relatively simple and regular spelling by the "look-say" method, then be given a few of the phonic rules chosen to be the most productive in increasing his reading vocabulary, but not so many as to slow his reading of simple texts – "basal readers" – designed to match his growing competence. Curriculum design centers around the relative emphasis to assign to the two strategies; at present the fashion is to be a little closer to the phonic-rule approach than to the whole-word approach. *The question for which we still need a definitive answer is how far the teaching of these initial skills must be carried before the child begins to generalize for himself.*

Another set of issues intrudes when we consider learning to write. Reading and writing are obviously mutually supporting skills, but teaching strategies range all the way from treating them as independent skills to the claim that

writing should be taught before (or instead of) reading. If spelling niceties are initially neglected, and if problems of motor coordination are bypassed by providing block letters or a typewriter, writing can be taught at an early age. *At present, neither learning process is well enough understood to enable us to evaluate claims about their interrelations or about instructional tactics based on such interrelations.*

The teaching methods and materials that are presently available seem adequate to enable most children to acquire at least minimal skills in decoding written texts. Even children who, for any of a variety of reasons, have difficulty with reading can be taught if the teacher has sufficient time and is sufficiently patient to take it – the fact that they are often neglected is more a consequence of the classroom situation than of any ultimate incapacity on the part of some children.

Further large effort to develop new versions of the reading curriculum along the familiar lines of curricula currently available is not advisable at this time, although pilot studies of alternative approaches should always be possible. Higher priority should be assigned to obtaining better information about what regularities of English orthography children are actually learning under the existing systems, and to the development of curricula better tailored to the prereading experience and abilities of children from minority groups.

The length of this discussion of visual-phonic skills should not be interpreted to mean that they deserve special emphasis from research workers. On the contrary, it means that the analysis of these skills has already received more attention, so that more is known about them, than have other aspects of the reading process.

c. ***Visuomotor skills.*** The fine distinctions that are needed to recognize letters and words can be made only in a small central region of the eye, called the *fovea.* The fovea is wide enough to encompass only a few letters at a time, so that the eye must move from point to point in order to read more than the shortest text. (How the rest of the eye, and peripheral vision, contributes to the process is not now known). The eye movements that are most important in reading are jumps that bring some new point, initially seen only in peripheral vision, into the fovea. About 4 such jumps, or saccades, can be made per second. A beginning reader must be able to direct his gaze successively from one point to another point close by as he spells out the text by letters or small groups of letters. As his pattern-recognition skills improve (and as his expectations about what the text will say improve), the points to which the eye moves can be further apart; he has to sample the text relatively infrequently. But in either case, controlled and purposeful eye movements are at the heart of skilled reading. In addition, the reader must be able to progress along the line without losing his place, horizontally or vertically. And finally, he must be able to fit the successive glimpses by which he has dissected the text back into a single ordered

structure, even though he frequently returns to look at material that his eyes have already traversed.

The eye movements that are made in the course of reading are therefore to be viewed as necessary skilled behaviors by which information is gathered; they are also to be viewed as sensitive indicators of what expectations the reader has about the text, and what he needs to know. Training procedures that attempt to improve the efficiency of the reader's eye movements deserve study, but the success of such efforts must be limited by how much knowledge the reader brings to the task, knowledge which permits him to fill in between widespread glances. That is to say, most of the attempts to give poor readers practice in performing eye movements *per se* have shown little promise: training the reader in efficient search behaviors is of little use unless he already has a sufficient base of knowledge about the world, and about the redundancies of language, to make such search behaviors profitable. *These search-training methods will have very circumscribed use until they are brought into the context of well-developed and explicit theoretical understanding of the reading processes they serve.*

Although there is a long history of studies of how eye movements contribute to the reading process, we need detailed tests of theoretical models of how the reading process proceeds. At present, the measurement of eye movements is cumbersome, expensive, time-consuming, and interferes with the natural set of the reader. To some extent, we can study the contribution of eye movements by "simulating" them (i.e., by presenting motion pictures of text which present sections of each line successively), and by other indirect methods, but these methods cannot be wholly satisfactory. *We need to develop better and less obtrusive methods of recording eye movements, and more rapid and economical ways of analyzing them.* We need such methods to assess readers' performance; to evaluate the effectiveness of teaching materials (including picture books, television, and animated displays); and to use in training procedures that make the display itself contingent on the eye movements that the reader executes. In any case, the recent development of recording devices that are directly coupled to computer-generated displays, and the simulation of eye movements by the use of motion pictures to provide successive views of texts or scenes, have resulted in much new information about the basic nature of the reading process.

Many of the tasks involved in acquiring basic literacy are difficult and unpleasant: making a succession of tightly controlled eye movements, which the beginner must do at least in the "sounding out" stages, is an unnatural and probably aversive way of using one's eyes; the ability to "combine" or "blend" phonic elements into syllables and words does not come easily (and in some cases takes an inordinate amount of practice to acquire at all). We might be able to make at least the initial stages of learning to read a great deal easier (e.g., by using letters and words that are easy to distinguish and to remember; by using

language, concepts and stories that are already familiar to the reader; by using pictures and text in an optimal balance to give the reader an advance idea of what the text is about without destroying his interest). *More research is needed on ways to make text as easy for the beginner to read as possible, and development and dissemination procedures (including television and comics) should be provided to bring the text to as wide an audience as possible.*

By minimizing early frustrations and difficulties, and by getting the child to the rewards of reading as rapidly as possible, it may be feasible to bypass some of the present sources of difficulty; it may be possible to reduce other difficulties to the status of less salient incidents; and it may be possible to defer the least immediate problems, and to provide intensive instruction in those letters and words whose teaching cannot be deferred and which experience has shown to be particularly difficult.

We cannot at this time be certain about the long-range effect of deferring difficult aspects of reading. *An analysis should be made of research results produced by the ITA experience, and of other field experiments related to this issue, to determine the extent to which initial gains are sustained after the reader graduates from the training alphabet to standard textual material.* If such gains dissipate entirely when the student finally has to face difficulties that have been bypassed during his early training, the expense of the effort to defer those difficulties must be justified on grounds other than the requirements of an effective literacy program.

In his briefing to the Study Group, Coleman asked for gathering all word-use data into one source, and spoke about his "engineering" tables based on such data. *We should determine what the actual predictive efficiency of such tables is (and – going somewhat beyond his proposal – try to induce what the distinctive features are and exaggerate them, where possible).* One would also like to see some attempt to scale stories (or themes or plots) in terms of their interest at different ages. Note that these studies need not be done with written texts; they could be done with animated cartoons or movies, and presented to preliterate and illiterate populations.

d. ***Cognitive skills.*** Over the years there has been a continuing controversy over the cognitive abilities involved in learning to read. In the past some have argued that a mental age of 6.5 is necessary before a child can profit from reading instruction. In more recent years, workers in the Piagetian tradition have argued that children should have acquired concrete operations (e.g., an ability to reason syllogistically) before reading instruction is undertaken.

The rationale for this position is that reading, from the very outset, is a complex cognitive process that enables a child to acquire meaning from the written word. From this point of view, even the acquisition of letter-sound correspondences requires an understanding that letters are arbitrary symbols. In

the absence of such understanding, it has been argued, the child may acquire habits that are detrimental to fluent reading and that might have to be unlearned later.

In support of this position are some studies showing that children who are taught reading early have no lasting advantage over those who are taught at a later age. Workers who support this "readiness" position also point to countries where reading is usually not introduced until the children are seven years old. In such countries (e.g., Russia, China, and certain European countries), reading difficulties of the kind encountered in America are said to be relatively rare. (It should be said, of course, that the writing systems of these countries might eliminate many of the cognitive problems posed by English orthography.) In any case, the position of the cognitive readiness group is that formal instruction in reading should be introduced no earlier than the first grade.

On the other side of the controversy are those who believe that reading instruction can, and perhaps should, be introduced early in life. The argument is that basic literacy, the connection of printed letters with spoken sounds, requires no more in the way of cognitive skills than discrimination and association. Since even very young children possess these abilities, there is no reason for not teaching children to read at an early age, either at home or in a nursery school or at a day-care center.

The real problem of teaching reading, according to the discrimination-association position, is to make the task sufficiently simple for young children. A number of large-scale research projects have been under way for quite some time with just this aim in mind. Their goal is to calibrate the difficulty of letter discriminations, of letter-sound correspondences, of blends, and so on, so that all the various analytic reading skills can be ranked with respect to difficulty from the child's point of view. Once this calibration is complete it should be possible to design reading programs that would move children from the simplest to the most difficult basic literacy skills in a systematic way.

In support of this "no readiness" position on reading instruction, examples are often cited of individual children who have been taught to read early. Likewise, studies in which children have been taught to read or attain basic literacy skills early by way of particular programs of instruction are also referred to as evidence that reading can be taught early. Experiments with Distar (SRA) and with ITA are of this sort. Other evidence comes from children who attend schools where reading is introduced before first grade, such as the Montessori schools. These schools provide additional evidence that reading can be taught before a specific age.

As in every controversy, differences in substance are often exaggerated by differences in definitions. Those who argue for the delay of formal instruction are at the same time quite vocal in advocating a variety of prereading experiences and activities. They propose that children experience a language-rich environ-

ment, that they be read to, that they become acquainted with words and letters, and that they have some experience in printing and writing. What the "readiness" group really opposes is putting young children into formal teaching situations where they must learn formal rules of phonics, spelling, and so on.

In practice, the "no readiness" group is really not far removed from the position of the "readiness" advocates. Programs for teaching reading to young children inevitably adapted to their characteristics as learners. Letter-sound correspondences can be taught in a multitude of ways, many of which are interesting and enjoyable for young children. In good programs of this kind, the needs, abilities, and interests of the children are used as a starting point for introducing basic literacy skills.

In view of the above discussion, some conclusions and suggestions for research can be made. *First, some clarity has to be brought into the discussion of reading instruction. Much of the controversy between the readiness and the no readiness groups derives from the definition of "formal reading instruction." It seems incumbent upon any research worker in this field to be explicit about the kinds of instruction he is undertaking and the extent to which it is modified in actual practice.*

It would seem appropriate for the NIE to support research into the cognitive processes (reasoning and perceptual abilities) that are involved in basic literacy skills. In addition, it would seem appropriate to support studies dealing with the analytic component of basic literacy skills, and which aim at calibrating and ranking these skills and building them into a comprehensive early reading program. Researchers working on both of these problems should be brought together to share their findings and views, and perhaps to arrive at commonly shared convictions and joint research ventures.

2. Comprehension of Language

There is no intrinsic difficulty (although there may be many practical and technical problems) in testing or measuring whether people can comprehend oral or written messages. Comprehension is tested by determining whether people, after receiving a message, can answer questions about its contents or implications, or can carry out its instructions. But there is a long leap from measuring comprehension of a message to discovering the thought processes a person must go through in order to achieve that comprehension.

Standard forms of school instruction in reading and language arts do much to facilitate the growth of language skills in elementary and secondary school children as they mature. These instructional methods are based on a wealth of practical experience in teaching, but they are probably most effective in handling average, normal children, because it is such children to whom most of out experience relates. Standard instructional programs are certainly not based on any extensive analysis of the processes underlying the skills, because such analysis still remains largely to be carried out.

With a better theoretical grasp of the reading comprehension process to supplement conventional wisdom, we could devise more powerful diagnostic tools to identify with accuracy the weak and strong points of individual students – the processes in which they are competent, and those in which they need additional help and training. With better diagnosis, our deeper understanding of process can also lead us to more effective teaching and learning techniques than those we now possess.

During the past decade there has been a great burst of new research activity in psychology and related disciplines aimed at understanding complex human thought processes, including processes for comprehending language and problem-solving processes. One reason for this burst of activity, and the consequent progress that has been made, is the availability of new tools of research – cameras for detecting and recording eye movements, and digital computers, to mention just two examples. These tools have provided us with new ways to identify successive steps in human thought processes, and to formulate models of those processes that will permit their operations and pathologies to be explored and tested. Studies of successive foci of attention in reading tasks, using eye-movement cameras and thinking-aloud protocols, should continue to expand on our knowledge of these processes.

How language conveys information from one person to another is no longer an unpenetrated mystery. Enough is known about how language carries meanings to permit us to write programs for computers that accept instructions in natural language, and other programs that solve the problems posed by those instructions and carry out the tasks they set. These programs "understand" language by the same criteria we use to assess human understanding – they can answer questions on the basis of what they have read, they can carry out instructions, they can solve simple problems. Moreover, these programs are open to analysis, so we can study exactly what processes enable them to do these things, and compare their processes with the behavior of humans to whom the same tasks are presented.

Computer simulation of human cognitive processes is one of several promising techniques for modeling the methods used by people to perform complex tasks. It is well adapted to diagnosis of individual differences in performance and to tracing the differences in process that underlie them. For example, in learning algebra, problems posed as stories – so called algebra word problems – are a matter of special difficulty for many students. Use of a computer program to model the processes of interpreting such problems, and comparison of the model with students' behaviors, reveals that there are (at least) two strikingly different styles for tackling these tasks. One style is based on a literal, grammatical translation of the problem statement; the other on conceiving a real-world situation that corresponds to the problem statement. Most students use one or the other of these processes almost exclusively and appear largely unaware of the

one they don't use. The ablest students, however, tend to use both processes in reinforcement of each other. This kind of process model can now be developed further as a tool to diagnose individual students' difficulties with word problems, and as a framework for developing any additional skills that students are found to lack.

There are today a substantial number of research groups using computer simulation methods in conjunction with laboratory experiments with human subjects in order to study complex thought processes, including language comprehension processes. These research groups can be found both in psychology departments and in the "artificial intelligence" divisions of computer science departments. At M.I.T., for example, a language understanding system has been constructed that answers questions and performs actions in a simulated "toy world" of blocks of various shapes and colors. At the Stanford Research Institute, a group is building a language-understanding "robot," capable of locomoting about the laboratory rooms. At the University of California, San Diego, a large "semantic net" simulated on a computer is used to study how humans store and retrieve the many varieties of information they need for such activities as preparing a meal in a kitchen. At Carnegie-Mellon University a computer has been programed to use phonological, grammatical, and semantic cues to understand spoken language. *These are but a sample of the many research activities where the computer is and could be used to explore the nature and processes of human language comprehension.*

Concern with understanding cognitive processes is not limited to researchers who use computer simulation as their main research tool. By timing carefully the relative speeds with which persons can perform various related language comprehension tasks, cues can be obtained as to the processing that is going on. That a person can answer the question, "Is John taller than Bob?" a tenth of a second faster than "Is Bob shorter than John?" may seem a curious but isolated fact. On the contrary, it is a fact that was predicted by linguistic theory, on the basis that "taller" is positively associated with the underlying dimension "height," while "shorter" is negatively associated with that dimension. Tens and hundreds of experiments about many such seemingly innocent features of language are beginning to tell us what skills a child must acquire in order to understand the spoken or written word.

Language understanding processes are also being illuminated by experiments of more traditional design. A written passage is a complex "stimulus" for an experimental subject. What a reader attends to and extracts from this stimulus depends very much upon instructions and other preconditions that determine his expectations and attention when he begins reading. The same material may be "read" and interpreted in a wide variety of ways in response to different instructions. Experiments like these begin to give us a scientific basis for classifying "styles" of reading, and for discovering the conditions that induce one or another style to be adopted by the reader.

Additional studies are needed that will look at understanding with and without external memory aids (paper and pencil, blackboard and chalk), that will require people to combine information acquired through reading with information presented in pictorial form, and that will compare one's understanding of identical information presented orally and in writing. Results of such experiments should broaden our understanding of comprehension by extending it to other ways of encoding the information that students are expected to learn.

Certain technological developments may be ready for application. For example, animated film has potential as a teaching aid, but the time required to "shape up" a lesson through several revisions makes animation expensive and slows the development process. Studies of picture-text interaction using still pictures, and studies of verbal and nonverbal comprehensibility using cinematic techniques are dreadfully expensive for the same reason. On the other hand, there are commercial developments that should help here, and support should be given to researchers attempting to develop alternative devices. There are commercial computergraphics concerns and facilities that should make compiling and revising pictorial displays relatively simple; and there are expensive editing machines that transfer all film to tape; permit computer editing, and then compile the edited film.

a. ***Measurement of comprehension and comprehensibility.*** Comprehension is tested by determining whether people, after reading a message, can answer questions about its contents or implications or can carry out its instructions. Various comprehension tests are in use, but they are in general not derived from any systematic theory, and they are all heavily dependent on verbal abilities in their execution. These may be serious limitations. A recurring theme in many of the presentations that were heard by this committee was that our verbal measures of how well a reader comprehends a written message are inadequate indices of what was grasped. Even more important is the fact that research with relatively nonverbal measures of comprehension suggests that verbal measures of an individual's reading ability do not agree with other measures of his ability to extract meaning (e.g., with the ability to comprehend and remember the meaning and arrangement of complex pictures).

We need nonverbal measures of comprehension. Such tools should be capable of measuring the comprehension of events that are relevant and familiar to the student (e.g., social relationships), and should not be tied to the items of the classroom nor to the articles of a particular (majority) culture. Pictures might play an important part in the development of such measures. For example, we might measure a reader's comprehension of a textual passage by its effects on the speed and accuracy with which the meaning of an otherwise ambiguous picture is apprehended. Alternatively, we might measure the accuracy with which either verbal or nonverbal instructions are followed, using nonverbal behavior as the test.

Measures of comprehension are needed not only to assess the performance of individuals or groups of subjects – they are also needed for the evaluation of how comprehensible a given message is to some group of readers. We need such measures of comprehensibility if we are to make the job of reading as easy as possible. Comprehensibility indices have been applied to textbook designs, advertising and instruction writing, but again the measures used bear little relation to any systematic theory of comprehension, and are specifically verbal in nature. Nonverbal measures of comprehensibility and measures of nonverbal comprehensibility, applicable to pictures and to other methods of communication, would be particularly valuable.

The issue of nonverbal comprehension raises the question of how best to use the various channels of information that we possess. Some kinds of information and concepts are obviously better presented by pictures (and especially by motion pictures and the video media) than by words. The ability to read efficiently depends in part on the reader's knowledge about the world, in a general sense, regardless of the channel through which he originally acquired that knowledge. *It seems highly desirable to undertake research directed at determining what kinds of knowledge are better understood, retained and put to use (cf. the "visual thinking" tradition) when presented in pictorial rather than in verbal form.* Such research would use measures of verbal and nonverbal comprehension to determine the principles that govern the comprehensibility of pictorial and textual material, as well as to determine the comprehension that has been achieved by a particular reader or category of readers.

b. ***Measures of attention.*** Similar steps are needed in the development of attention measures. Particularly important here are questions of unobtrusiveness of the recording devices, closeness to online conditions, and wide validity. Brainwave devices (e.g., central nervous system measures) are probably not usable at the present state of the art. Pupilary diameter appears to be a measure more of cognitive load than of attention as we normally want to measure it, and the history of attempts to measure it automatically is not encouraging.

3. Writing

We have said that reading and writing are mutually supporting skills. Just as little is known about the stages a person goes through in learning to read, so little (even less) is known about stages in learning to write – from early scribbles to simple but complete and coherent compositions.

A useful way to start would be to make detailed, longitudinal case studies of individual children encouraged to write as well as read. How does the form of a child's writing evolve from isolated letters and words to a faithful representation of his spoken language? What are the stages by which spelling shifts from

invented solutions toward more standard orthography? In multi-sentence compositions, what thematic organizations do young children use – spatial, temporal or other? What seem to be the relations between stages in learning to write and stages in learning to read? And what are the similarities and differences across children?

4. Second-language Learning

For children who come from non-English-speaking homes, literacy in English must grow from a foundation of acquisition of oral English as a second language. Although there is now a considerable body of research on the child's acquisition of his first language, the same detailed descriptions do not exist for second-language acquisition. *Here, as elsewhere, we stress the importance of detailed analytic studies of learning under varied environmental conditions, rather than comparisons of instructional programs.*

How do stages in the acquisition of English as a second language differ from stages in the acquisition of English as a native language? Do these stages differ in nature or rate at different ages? For example, if a Spanish-speaking child is taught in his native language during the beginning years of school and learns English at 7 or 8 rather than 5 or 6, what are the costs and what are the gains? And if that child learns to read first in Spanish, is there positive transfer (or negative interference) when that child confronts the task of learning to read in English?

Although a variety of bilingual education programs should be supported now, there will be limits to our attempts to improve education for non-English-speaking children without better answers to these questions.

It should be obvious from this review that the Study Group felt a need for more research on a wide variety of processes involved in or related to the reading process and the learning of reading. This opinion should not be taken to mean that good research has not already been done – the quality of research in this field has improved markedly during the past decade as more scientists have become interested in it. Indeed, it is this recent revival of interest that encouraged us to believe that it would be possible to advance rather rapidly toward the research goals that we have outlined, and that the NIE would be well advised to place high priority on exploiting the opportunities that presently exist.

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